Contribution ID: **15**   Type: **not specified**

Dark Showers in Herwig 7 and Comparisons with Pythia 8

Wednesday 22 January 2025 14:00 (15 minutes)

We present the new implementation of Dark Showers in the Herwig 7 generator. This implementation features for the first time an angular ordered dark shower and dark hadronisation implemented via the cluster hadronisation model. This talk will cover the scale hierarchies involved in dark shower models, and how to pick sensible values for generator parameters based on these scales. Secondly, the talk will explore the impact of hadronisation. This has not yet been much discussed in the context of dark showers, but is potentially a large effect since current event generators use semi-empirical hadronisation models tuned to SM data. A method for estimating the size of this effect on the current cluster hadronisation model will be presented and on-going work to move to more theoretically motivated models with fewer tunable parameters discussed.

AND

We present an ongoing effort to compare the new Herwig Dark Showers code with the existing Pythia Hidden Valley module. In addition to the physical parameters of the model, an event generator requires a number of semi-empirical settings to be tuned, particularly in the hadronisation. Since no dark showers have yet been observed, the best choices for these parameters can only be estimated using intuition from QCD. The aim of these studies is to determine which observables are consistent between generators and for variations of the tunable parameters, and hence are more reliable for use in future analyses, and identify pitfalls for parameter setting. This talk will introduce the theoretically motivated benchmarks proposed in the Snowmass white paper on dark showers, which are used in this study, and present initial lessons learnt from attempting consistent parameter setting between generators.

Are you happy to have the meeting recorded?

Yes

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Session Classification: Extended Talks